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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/777,755	02/13/2004	John T. Moore	M4065.0694/P694-A	5324
24998	7590	09/02/2004	EXAMINER	
DICKSTEIN SHAPIRO MORIN & OSHINSKY LLP			THOMPSON, CRAIG	
2101 L STREET NW			ART UNIT	
WASHINGTON, DC 20037-1526			PAPER NUMBER	
			2813	

DATE MAILED: 09/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/777,755	Applicant(s) MOORE ET AL.	
	Examiner Craig A. Thompson	Art Unit 2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 July 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 51-76 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 51-76 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>7/16/04 and 2/13/04</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION***Double Patenting***

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 51-59, and 63-73 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-12 of Moore et al., U.S. Patent No. 6,709,887 (" '887 "). Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims parent '887 application (of which the current application is a continuation) teaches all of the

Art Unit: 2813

limitations of the current invention using specific photodiffusion/reaction/irradiation whereas the current application claims the invention more broadly using the broader step of general diffusion.

For purposes of clarity, the more limitation-per-limitation-matchable rejections of claims 66-73 are followed by explanations of how claims 51-59 and 63-65 are similarly rejected.

With respect to claim 66, '887—claim 6 verbatim teaches a method for forming a non-volatile resistive variable device including forming a first metal layer over a substrate, forming a second metal layer on the first layer, patterning the second metal layer into a structure having an outer surface [,] and exposing [said] the first meal layer, blanket depositing a chalcogenide material over the [said] substrate on [said] the second metal structure outer surface and on [said] the exposed first metal layer. '887—claim 6 also teaches diffusing a portion of the patterned second metal outwardly into a portion of the chalcogenide material (using an irradiating step).

With respect to claim 67, '887—claim 6 also teaches selectively etching the portion of [said] the chalcogenide material which is not doped with the second metal, which is the portion into which the metal has not been diffused. '887—claim 6 also teaches after the etching forming an outer electrode over the chalcogenide material, which is the portion that is doped or into which the metal has been diffused.

With respect to claim 68, '887—claim 7 teaches dry anisotropic etching. With respect to claim 69, '887—claim 8 teaches dry anisotropic etching using a gas chemistry comprising CF_4 . With respect to claim 70, '887—claim 9 teaches diffusing

Art Unit: 2813

only some of the metal into the chalcogenide material. Only some is less than all. With respect to claim 71, '887—claim 10 teaches (the diffused) structure having a shape that is maintained but at a reduced size, which is smaller but substantially the same shape. With respect to claim 73, '887—claim 6 teaches irradiating through the chalcogenide to the patterned second metal.

With respect to claim 72, '887—claim 6 clearly teaches diffusing some (i.e. not none) of the second metal into the chalcogenide. Furthermore, '887—claim 9 depends on '887—claim 6 and further requires diffusing only some metal. Therefore, for '887—claim 9 to further limit the claim on which it depends, '887—claim 6 must also include the scope of diffusing all of the second metal.

Claims 51-59, and 63-65 are similar to claims 66-73 and are rejected for similar and additional reasons provided below.

With respect to claim 51, '887—claim 6 teaches a method for forming a non-volatile resistance variable device including forming and patterning a metal (second metal layer) into a structure having an outer surface (i.e. a projecting metal mass) on a substrate (which necessarily teaches forming a substrate), surrounding (blanket depositing over the substrate and the metal structure) the surface of the projecting metal and diffusing the metal mass outwardly into a chalcogenide before forming an electrode over the chalcogenide material. Similarly, and admittedly without mentioning the substrate, '887—claim 1 teaches surrounding an exposed outer surface of a projecting metal mass with chalcogenide material, diffusing the metal mass outwardly

Art Unit: 2813

into the chalcogenide material (through irradiating) and forming an electrode over the chalcogenide.

With respect to claim 52, '887—claim 6 includes the steps of forming the metal layer on the substrate and patterning the metal mass to have an outer exposed surface. The examiner notes that the second metal of '887—claim 6 is still over the substrate because it is over the first metal (electrode) layer, which is directly on the substrate.

With respect to claim 53, the patterned metal structure of '887—claim 6 would form metal surfaces with angles. With respect to claim 54, '887—claim 3 teaches forming the surfaces at angles within 15 degrees of normal. With respect to claim 55, '887—claim 9 teaches diffusing only some (i.e. less than all) of the metal. With respect to claim 56, '887—claim 10 teaches forming the diffused region smaller than but the same shape as the projected metal. With respect to claim 57, this claim is rejected for the same or similar reasons provided for claim 72 above. With respect to claim 58, '887—claim 6 teaches blanket deposition. With respect to claim 59, '887—claim 6 teaches irradiating through the chalcogenide to the projecting metal mass.

Double Patenting - Claims 60-62 and 74-76

Claims 60-62 and 74-76 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over '887—claim 6 in view of Spaeth et al., U.S. Patent No. 4,158,133, " '133". Claim 62 depends on claims 60 and 59 which was rejected over '887—claim 6. The claims of '887 do not specifically teach using 405 nm light for diffusing the silver. The examiner notes that the use of a laser for

Art Unit: 2813

heating, annealing and doping is well known in the art of semiconductor fabrication. '133 teaches that thin silver films have a peak transmission at 405 nm. This would be an obvious selection for a wavelength for heating the silver because otherwise the diffused silver in the chalcogenide would absorb and not permit further irradiation of the undiffused metal surface beneath. At the time of invention it would have been obvious to one of ordinary skill in the skill of microelectronic device fabrication to have used 405 nm radiation as in claim 62 as taught by '133. The motivation at the time of invention would have been maximized or optimized irradiation of the projected metal as taught by '133. Claims 61 and 60 are rejected for the same or similar reasons provided for 62 above.

Claim 76 depends on claims 74 and 73 which was rejected over '887—claim 6. The claims of '887 do not specifically teach using 405 nm light for diffusing the silver. The examiner notes that the use of a laser for heating, annealing and doping is well known in the art of semiconductor fabrication. '133 teaches that thin silver films have a peak transmission at 405 nm. This would be an obvious selection for a wavelength for heating the silver because otherwise the diffused silver in the chalcogenide would absorb and not permit further irradiation of the undiffused metal surface beneath. At the time of invention it would have been obvious to one of ordinary skill in the skill of microelectronic device fabrication to have used 405 nm radiation as in claim 76 as taught by '133. The motivation at the time of invention would have been maximized or optimized irradiation of the projected metal as taught by '133. Claims 75 and 74 are rejected for the same or similar reasons provided for 76 above.


Art Unit: 2813

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Craig A. Thompson whose telephone number is (571)272-1699. The examiner can normally be reached on Monday-Friday 8:00 am - 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr. can be reached on (571)272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Craig A. Thompson
Primary Examiner
Art Unit 2813

1 September 2004